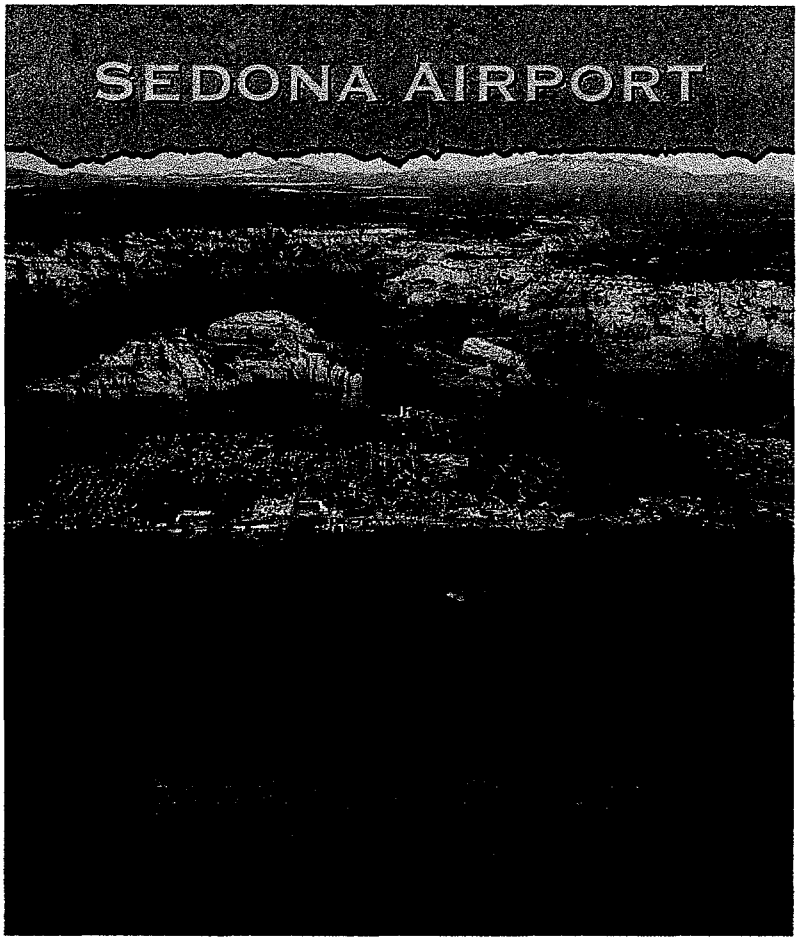


AVIATION DEMAND FORECAST

Chapter 3
AVIATION DEMAND FORECASTS

3.1 INTRODUCTION

Airport Master Plans must be developed on the basis of forecasts, which are usually prepared in terms of annual activity in short five (5), medium ten (10), and long twenty (20), year periods. The proper planning of future facilities begins with determining the aviation activity that Sedona Airport can reasonably expect over the 20-year planning period. The forecasts projected in this chapter will form the basis for determining the type, quantity, and size of aviation facilities, required through the year 2017.

General Aviation is defined as the portion of the aircraft fleet that encompasses all facets of aviation except commercial airline and military operations. To determine the types and sizes of facilities that may be planned to accommodate general aviation activity, certain key indicators of this activity must be forecast. Indicators of general aviation demand include, but are not limited to the following:

- Based Aircraft
- Aircraft Fleet Mix
- Annual Aircraft Operations
- Peaking Characteristics

This section introduces an analysis of aviation activity forecasts at Sedona Airport through the 20-year planning period. Initially, the forecasts are used to analyze the capacity of the airfield and the terminal area. The next step is to evaluate the role of the airport in the regional airport system, which may affect the need for improved navigational systems. Later in the study, the projections are used to prepare development alternatives. Finally, the aviation forecasts are used to develop a financial program as well as identify preliminary environmental effects including noise.

3.2 FORECASTING METHODOLOGY

The primary objective of a forecasting effort is to define the magnitude of change that can be expected over time. The systematic development of aviation forecasts involves both analytical and judgmental processes. A series of mathematical relationships between aviation activity and other demographic characteristics are tested to establish the rationale and logic of the projections. The analysis begins with the assessment of historic trends of aviation indicators at the local, regional and national level. Aviation related factors such as aircraft operations, based, and registered aircraft and fuel sales records were obtained for analyses. Similarly, socioeconomic factors such as population and employment were analyzed to determine their influence on aviation activity at Sedona Airport. The comparisons of the relationships between these various indicators provide the initial step in the development of realistic forecasts of aviation demand.

3.2.1 Time Series Model

A time-series model is the simplest, most widely used method of forecasting. This technique identifies trend lines based upon historic relationships extended into the future with the assumption that events in the past will continue to happen in the future.

Forecasts developed through the use of this technique are called projections. Projections are made and evaluated in comparison to forecasts from other sources using good judgment in predicting those changing factors that might keep history from repeating. While this can be a broad assumption, it does provide a fairly reliable benchmark to compare the results of other analyses.

3.2.2 Correlation Analyses

Correlation analysis examines the direct relationship between two or more sets of historic data. Used primarily as a statistical test on several variables, this analysis will detect significant relationships between sets of variables; the closer the relationship, the greater the degree of correlation. These sets of variables can then be evaluated further using several types of regression analyses.

3.2.3 Regression Analyses

In regression analyses, projections of a specific aviation demand element (dependent variable) are prepared based upon its relationship to one or more other factors (independent variable) which influence aviation demand elements in question. Aircraft operations and based aircraft are examples of dependent variables, while population, per-capita income, or other socioeconomic factors are examples of independent variables. Linear, curvilinear, and multiple regression analyses all can be tested in an attempt to define the best relationship from which future activity can be projected

3.2.4 Market Share Analyses

The market-share technique involves a review of aviation activity indicators in terms of a larger aviation market. The local share-of-the-market factor is then multiplied by forecasts of the larger total market, resulting in a projection of the local activity. This top-down approach usually proves quite accurate and serves as a check on the validity of other techniques.

3.2.5 Forecast Criteria

The following four primary elements are used for determining current and future aviation activity at Sedona Airport:

- Consideration of current socioeconomic trends
- Evaluation of available data on historical and current activity
- Testing of forecasting models
- Review of existing federal, state and local forecasts

These tasks overlap rather than fall in an independent sequential process. The primary point to remember is that the forecasts serve only as guidelines and planning must remain flexible enough to respond to unforeseen events. The master plan must also preserve the capability to respond to significant changes in aviation demand or to take advantage of market opportunities.

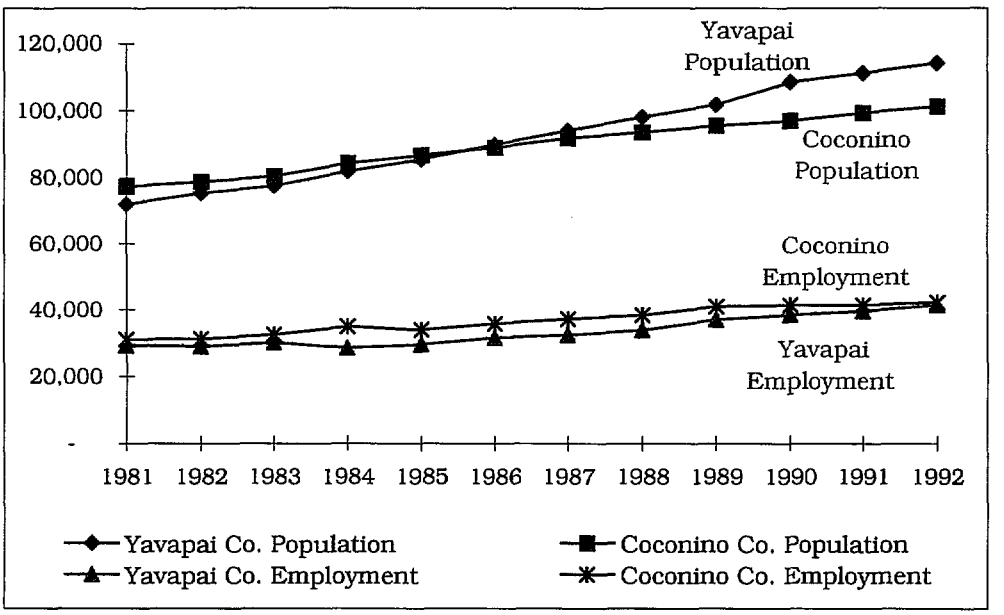
3.3 REGIONAL SOCIOECONOMIC CHARACTERISTICS AND FORECASTS

3.3.1 Population Trends

A good indicator of trends in aviation demand will be reflected in comparisons of different socioeconomic variables, such as population and employment. The population growth in Northern Arizona will influence the need for additional aviation facilities and services. As shown in Exhibit 3-1, the trends of the population in surrounding counties are compared with employment for the same counties. The graph reflects a continual growth in population for both Yavapai and Coconino Counties. In comparison, the employment trend shows a more gradual and incremental increase for the same period. This indicates a strong economic base in the region that potentially supports the necessity of aviation services. In turn, there is a much greater need for air transportation, which has a 'domino' effect in requiring aircraft, as well as aircraft and passengers requiring airport facilities and services. Therefore, the need for additional airport facilities will certainly be influenced as the population and employment within both counties continues to grow.

Area County Population and Employment

Exhibit 3-1



The population growth for Coconino and Yavapai Counties from 1992 to 1997 was 16 percent and 25 percent, respectively. The Sedona area was at 21 percent population growth for the same period.

A comparison of population trends between Yavapai County, Coconino County and Sedona may provide another indicator of future aviation demand. In addition to the resident population of Sedona, there is a rural population that must be included within the population served by the airport.

As indicated in the employment section, it is assumed and estimated that a portion of Yavapai and Coconino County residents derive some benefit or use from the Sedona Airport. Therefore, the overall county population figures will also be used to analyze potential aviation demands at the airport. This combination of city and county population figures should provide a more reliable indication of how population in the area will affect aviation demand at Sedona Airport.

As shown in **Table 3-1**, a comparison of population growth trends for the City of Sedona, the state of Arizona, and Yavapai and Coconino Counties is also used to establish relationships with independent variables at a regional level. The table shows both historic data and the most recent population projections from the Department of Economic Security.

Population Forecast by Region

Table 3-1

Population	1992[1]	1997[2]	% Growth	2002	2007	% Growth	2017
Sedona	8,090	9,760	21%	10,750	12,265	12%	15,482
Coconino County	101,350	117,475	16%	124,173	137,654	9.9%	169,800
Yavapai County	114,110	142,075	25%	148,419	169,602	12%	214,347
Arizona	3,858,850	4,600,275	19%	4,831,767	5,410,304	11%	6,733,780

Note: Sedona's population counts include only the incorporated city limits.
Source for 2002-2017: Arizona DES Projections, August 1, 1997

3.3.2 Forecast Methodology

The following represents the basic steps in the forecasting effort:

- Establish the Airport Service Area
- Review and assess historical aviation demand and socioeconomic data, as available.
- Identify a relationship/correlation with based aircraft and one or more socioeconomic variables. This resulted in the identification of a relationship between based aircraft and population (ratio of based aircraft per 1000 population). *Note: Population data for the City of Sedona, Yavapai and Coconino Counties was derived from the Arizona Department of Economic Security (May 1997).*
- Review population projections from Department of Economic Security (DES) and compare with the Sedona Community Plan projections.
- Apply based aircraft per 1,000-population ratio to the population projections to establish forecasts for Sedona Airport based aircraft over the planning period (20 years).

[1] Population Statistic Unit Report –DES,1995

[2] Revised Population Estimates for July 1, 1997 –DES, 1997

Airport Service Area

As shown previously in Chapter 1, the scope of the Master Plan limits data collection to a physical area designated as the Airport Service Area. From all points within the Service Area, Sedona Airport is assumed to be the facility most often used for air travel. Factors considered in determining time and convenience included input from PAC members, mileage, prevailing highway speeds, traffic flow and attractions in the area.

Population Forecast

The Sedona Airport service area extends beyond the boundary of the City of Sedona and into the rural areas of the county (partially overlapping service areas associated with other community airports). Therefore, it is important to note that the population base identified is not necessarily tied only to the Sedona Airport. It should also be recognized that in addition to the resident population of Sedona, there is a seasonal Sedona population and rural population beyond Sedona that is also served by the Sedona Airport. The rural population that lies outside of Sedona is contained in parts of both Yavapai and Coconino Counties. Sedona's seasonal population consists largely of residents from the Phoenix and Tucson areas that have summer homes in Sedona. These seasonal residents not only have an impact on the local economy, they also contribute to the need for aviation facilities and services.

The seasonal population was estimated using a "seasonal" vacancy rate of 89.7 percent of available units and two persons per household (Economic Base Study, Sedona Community Plan, Sunregion Associates, Inc. pg. 3-3). This seasonal population was added to the permanent resident population to derive the total population for the City of Sedona.

The Service Area was identified with a geographic boundary. The following cities were identified to better outline (geographically) the service area for Sedona Airport:

- ***Coconino County***: Sedona and Oak Creek Canyon
- ***Yavapai County*** : Oak Creek Canyon, Big Park, Camp Verde, Cornville, Lake Montezuma, CCD Remainder (Census County Division)

Table 3-2 lists the following cities included in the Service Area. Although the town of Cottonwood is within the NPIAS 30-minute criteria, it has its own general aviation airport serving the community and thus, was excluded from the Sedona Airport Service Area.

Population by Specific Cities Defined as Part of the Service Area for Sedona Airport

Table 3-2

Population by City (Service Area)	1997	2000	2005	2015
Cornville	2,783	3,083	3,807	4,683
Big Park	4,134	4,614	5,453	7,175
Camp Verde	7,999	8,742	10,051	12,759
Lake Montezuma	2,257	2,437	2,752	3,398
CCD Remainder*	4,151	4,370	4,686	5,123
Oak Creek Canyon	320	330	344	358
Sedona Permanent Residents	9,466	10,099	11,230	13,521
Sedona Seasonal Residents	1,656	1,704	1,743	2,158
Total Population in Modified Service Area (Geographic Method)	32,766	35,379	40,066	49,175

***CCD (Census County Division)** is the subdivision of a county that is delineated by the Census Bureau in cooperation with State Officials and local census statistical area committees for statistical purpose. The remainder is the population within each county that the CCD subdivision does not include.

3.3.3 Employment and Income Trends

Despite the economic recession that took place in Arizona during the late 1980's and early 1990's, the economy of this region of the state continued to flourish. During that same period, the area experienced sporadic growth in various segments of the local economy, which is greatly dependent on tourism and as such can be quite sensitive to any fluctuations.

However, due to Sedona's prosperous area, the local economy remains strong and rapidly growing with other parts of the state. Prospects for long-term economic growth also remain positive.

Employment

Historically, the Sedona area economy has been dominated by recreational and tourist-oriented activities. In 1996, It was estimated that about $85 million, in retail sales, was attributable to visitor spending in Sedona.[3] Total visitor expenditures are estimated between $138 and $152 million for 1996. In recent years, however, employment in finance, insurance, real estate (FIRE) and construction of homes in the area has made this the second largest industry, comprising about 22.6 percent of the local economy.[4] The employment characteristics in Sedona also impact the base economy for the area. According to the June 1998 Sedona Community Plan, Sedona residents hold 40.5 percent of jobs in Sedona and others who reside outside the city hold 59.5 percent. Furthermore, about 30.8 percent of employed Sedona residents work outside the Sedona city limits. There are several major employers in the Sedona area and the seven largest industries in terms of employment in the Sedona area are listed in **Table 3-3**.

[3] Sedona Community Plan, June 8, 1998 (pg. 9-2)

[4] Sedona Community Plan, June 8, 1998 (pg. 3-44)

Sedona's Business and Percentage of Employment Structure[5]

Table 3-3

Industry	% of Employment 1990	1995
Retail Services	71.90%	72.20%
Finance, Insurance and Real Estate (FIRE)	12.10%	11.60%
Construction	8.50%	11.00%
Transportation, Communication and Public Utilities	3.30%	4.10%
Manufacturing	3.30%	1.10%
Wholesale Trade	0.90%	NA
Agricultural Services	0.70%	NA

Unemployment in Sedona has steadily declined through the

years. The rate declined from 5.3 percent in 1980 to 2.3 percent in 1997, a low rate compared to Yavapai and Coconino Counties with unemployment rates of 3.8 percent and 6.9 percent, respectively, in September 1997. This difference in unemployment rates tends to confirm that a majority of unemployment is outside the incorporated Sedona city limits.

Per Capita Income

As indicated in the *1998 Sedona Community Plan,* the per capita income for Sedona in 1989 was $19,893. As shown in **Table 3-4**, the Sedona area's per capita income was greater, an average of 38 percent higher, than Yavapai and Coconino Counties and Arizona. Income projections are also reflected for the same region through the year 2020.

[5] Source: Sunregion Associates, Inc. Sedona Business Survey/Hansen Light Works Business Data List (11/25/97)

Per Capita Income Forecast for the Sedona Area [6]

Table 3-4

Income	Sedona	Yavapai	Coconino	Arizona
1989 Per Capita	$19,893	$12,657	$10,580	$13,461
% Difference	----	36%	47%	32%
Per Capita Forecasts	**Sedona**	**Yavapai**	**Coconino**	**Arizona**
2000	$26,259	$16,707	$13,966	$22,479
2010	$34,662	$22,054	$18,435	$24,524
2020	$45,753	$29,111	$24,334	$26,756

The per capita income reflects the affluence of the Sedona area. Income level can also be an indicator of aviation demand. Thus, the strong Sedona income projections support the projection of continued growth in aviation demand. Further discussion of the relationship between these variables is presented later.

3.4 NATIONAL AND REGIONAL TRENDS IN GENERAL AVIATION AIRCRAFT

Since 1978, the national general aviation industry has been affected by a number of events. These events have reduced the demand for general aviation aircraft and changed the conditions influencing future growth in the general aviation fleet.[7] These conditions include:

- The deregulation of the commercial airline industry in 1978 and the related increases in airline service;
- Continued increases in the cost of owning and operating a general aviation aircraft, including the initial cost of purchasing an aircraft, fuel and maintenance costs, increasing product liability costs, and fluctuating interest rates; and
- National economic recessions in 1981 and 1990.

- Between 1978 and 1988, the national general aviation fleet increased an average of 2.4 percent per year. In Arizona, however, the number of general aviation aircraft increased at a faster rate than the nation—an average of 3.5 percent per year.

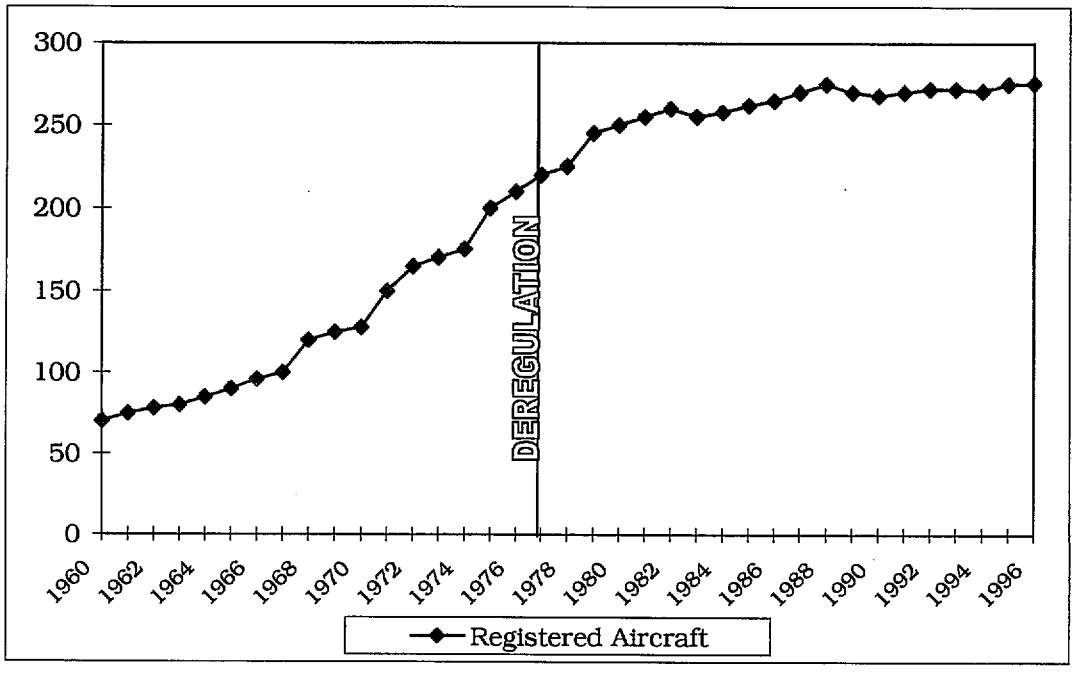
- Between 1989 and 1995, the demand for general aviation aircraft in the nation remained relatively unchanged with an average increase of 0.2 percent per year (see Exhibit 3-2). In Arizona, the numbers of general aviation aircraft increased an average of 0.4 percent per year during this period.

[6] 1990 US Census, Arizona Department of Economic Security

[7] Sources: Survey of Current Business, and U.S. Department of Transportation, Federal Aviation Administration, Census of U.S. Civil Aircraft, calendar year editions.

Historical Trends in U.S. General Aviation Registered Aircraft

Exhibit 3-2



3.4.1 National Trends Influencing General Aviation and Based Aircraft Demand

Characteristics of national trends in general aviation also influence demand at the local level. Several external factors have had significant impacts on the general aviation industry during the period covered by the historical data. Economic recessions, fuel prices, product and general liability insurance, and changes in tax laws have all had dramatic impacts on aircraft ownership. The following summarizes factors that have impacted general aviation and more specifically, based aircraft demand at a national level.

1. **The Ownership Costs of General Aviation Aircraft.** Since 1970, the ownership costs associated with a general aviation aircraft, including the purchase price and the real costs of owning the aircraft, have influenced the demand for general aviation aircraft. In the future, the costs and therefore demand for general aviation aircraft may be affected by changes in any of the following:

   - Product liability laws that define the liability on general aviation aircraft manufacturers--the U.S. Congress passed legislation to limit the liability on General Aviation aircraft manufacturers to 15 years from the date of manufacture;
   - Changes in technology in manufacturing general aviation aircraft; and
   - Increased domestic and international markets for general aviation aircraft.

2. **The Decline of Aircraft Production.** According to the FAA, business flights accounted for two-thirds of all general aviation flying in 1992. In recent years, the production of single engine

aircraft has virtually ceased and the general aviation market has shifted to the production of twin engine aircraft and business jets.

3. **Consumer Preferences.** Consumer preferences regarding leisure time devoted to General Aviation aircraft use are expected to continue to influence the demand for such aircraft in the future.

3.4.2 Local and Regional Trends Influencing Aviation Demand at Sedona Airport

There are several trends that influenced the baseline conditions for the Sedona aviation activity forecasts, many of which will continue to influence demand in the future. Trend information was collected through various sources including Sedona area-related documents and files, on-site visits and interviews with airport staff, and excerpts from the 1992 Master Plan.

1. **Population and Economic Growth.** Yavapai County and Coconino County have experienced an average population increase of 16 percent and 25 percent, respectively, from 1992-1997. Sedona's economy, in line with the tourism market, has fluctuated in the last ten years. However, due to the area's affluence, the number of based aircraft was not significantly affected by any downturn in the economy.

   There are similar relationships between the level of demand for general aviation based aircraft and several variables, such as the size of the population base and the levels of the economic activity in the Sedona area. Moreover, the higher personal income within the population indicates a strong relationship to potential aircraft ownership.

2. **Large number of transient aircraft.**
   Local operations represent about 67 percent and itinerant about 33 percent of the total operations. According to the airport manager, approximately 58 percent of the local operations are performed by transient aircraft and 42 percent are by local based aircraft (tours & charter).

3. **Feasibility of Scheduled Service to Sedona Airport.** The potential of scheduled service for this area has been tested through several commuter attempts. As the tourist market and the business community increase in the area, the probability for successful scheduled service will also increase.

4. **Apparent Lack of Competition within the Service Area.** Sedona has established itself as a unique community. The attractions and services are established as very distinctive markets, which may have potential aviation demand influence outside the area and the state.

5. **Favorable Weather and Flying Conditions in Arizona.** At Sedona airport, the favorable weather and flying conditions also support the demand for general aviation aircraft year-round. This weather influence may also drive more transient traffic to the Sedona airport.

3.5 BASED AIRCRAFT FORECAST

Because activity at an airport will be largely related to the number of based aircraft, the factors that influence basing potential must be examined closely. The local forecasts will examine various economic and demographic factors, along with historic trends. Furthermore, this data has been examined on state and local levels in the past. Thus, the projected forecasts will also be based upon conditions developed and compared with previous studies.

3.5.1 Airport User Types

To better understand the dynamics of the Sedona Airport, the types of users must be defined. Further, this provides an indication of the types of aircraft flown and operations conducted, and thus, the appropriate facilities needed during the planning period. The current Sedona Airport users are identified as follows:

- **Recreational Flyers.** The general aviation users at Sedona Airport include active private aircraft owners, owners of kit and homebuilt aircraft, and aircraft that are being reconstructed.

- **Job Commuters (flying to and from work).** There are an increasing number of local aircraft owners who commute to jobs outside the Sedona area from the Sedona Airport. This is reflected in the subsequent population and employment sections, which indicate that approximately 15 percent of Sedona residents (seasonal) live part of the year outside the area and 31 percent work outside the city limits.

- **Student Pilots.** Several fixed based operators at Sedona Airport provide flight instruction. An aviation university (Embry-Riddle), located in nearby Prescott, utilizes Sedona Airport for practice areas as part of their pilot training. Student pilot training is prominent in Arizona, due to the state's weather and airport system. Further, Sedona's scenic appeal makes it a desirable location for pilot trainees.

- **Tour and Charter Operators.** Most of the operators at Sedona Airport operate recreational aerial tours and charter flights daily. The tourist market has a direct impact on the tour and charter operations at the airport. According to the Sedona Community Plan, in 1996, both out-of-state and Arizona resident visitors spent between $138 and $152 million in Sedona, a 116 to 124 percent increase from 1989. As a direct result, the Sedona Airport's local tour and charter operators have expanded in size and increased in operations.

  As part of the private local aircraft users, there are a large number of business-related flights that operate in and out of the Sedona Airport, too. As the metropolitan Phoenix area continues to be a leader in high-technology businesses, the potential aviation demand also increases. Due to its close proximity to Phoenix, the Sedona area lends itself to increasingly more business-oriented visitors. In 1995, approximately 6 percent of visitors came to Sedona for business-related activities.[8] To provide for the growing business market, several private charter and tour operators based at the Sedona Airport have expanded to serve the demand. This growth has resulted in an increased share of total operations for charter and business flights.

3.5.2 Annual Based Aircraft Forecasts

For Sedona, the number of based aircraft at the airport is the primary indicator of general aviation demand. By first developing a forecast of the number of based aircraft, the growth in the other demand indicators can then be projected. The other demand factors are directly related to the type and number of based aircraft at the airport. Other factors such as the economy will also have a bearing on aviation demand.

[8] Sedona Community Plan, pg. 3-49, Table 25 – Sedona Forum XIII, Background Research Report (1995)

Comparison of Forecasts

The following is a brief comparison of the various forecasting methods used in determining Sedona Airport's based aircraft projections.

Trend and/or Time Series Analysis (pg. 2). Aircraft registration data compiled from the 1995 Arizona State Aviation Needs Study (SANS) was extracted from the FAA Form 5010 and ADOT Registrations, which tend to be lower than actual based aircraft at any airport. To accomplish a realistic projection, the trend curves developed from the 1995 SANS data are shown primarily for comparison with the other projections. The analysis resulted in a projection of 151 based aircraft by 2017.

Market Share Analysis (pg. 2). The total number of Arizona registered aircraft would not normally exert a significant influence on the number of based aircraft at a single airport. However, the based aircraft totals for the number of aircraft in Maricopa and Pima counties heavily influences the state. Registered aircraft in these two counties comprise nearly 70 percent of total registered aircraft in the state.[9] Meanwhile, the number of aircraft based at Sedona Airport represents a good portion of aircraft registered in Yavapai and Coconino Counties.

According to the 1995 SANS Report, the projections for the Sedona Airport's based aircraft in 1997 had an average of 17 percent market share of Yavapai and Coconino Counties. Therefore, Sedona's market share indicates a direct relationship to the other counties. However, Sedona Airport's share of the counties' aircraft may not be constant, increasing or decreasing depending on other tourist market forces. Thus, the market share can only be used as a gauge to help validate the future based aircraft forecast. The Market Share Analysis, based on a 17 percent share of county registered aircraft, resulted in a higher forecast (155 based aircraft) than the Trend Analysis of 151 based aircraft by 2017.

Regression Analysis -- 1999 Master Plan Forecast. This is the preferred forecast for based aircraft and resulted in a total projection of 156 based aircraft by the year 2017. Establishing a regression model to project total based aircraft and the relationships with independent variables, such as population and employment derived this forecast. Furthermore, the preferred analysis projected the independent population variable (Sedona's Area Population Level), which represented a percentage of population outside the Sedona area. In this case, the model considered the direct impact of population and employment outside the Sedona city limits and its relationship to the Sedona Airport's based aircraft activity.

Correlation Process. The1995 SANS projection model produced a total of 151 based aircraft projected for the year 2017 and the Market Share Analysis projected 155 based aircraft for the same year. The latter projection falls more closely in line with the preferred forecast projecting a total of 156 based aircraft by the year 2017. Thus, the correlation with the other analyses supports the regression model's assumptions and validity of the projections. **Table 3-5** compares the various projections of based aircraft determined from the above analyses. The preferred planning forecast used for this study is titled '1999 Master Plan.'

[9] 1995 Arizona State Aviation Needs Study

Comparison of Based Aircraft Forecasts – Sedona

Table 3-5

Trend Analysis 1995 SANS	1992 (Base Year)	1997	2002	2007	2017
Coconino	NA	153	169	185	227
Yavapai	NA	400	451	508	671
Sedona	NA	91	102	115	151
Market Analysis					
Sedona	NA	94	113	118	155
1999 Master Plan					
Sedona	92	103	119	128	156

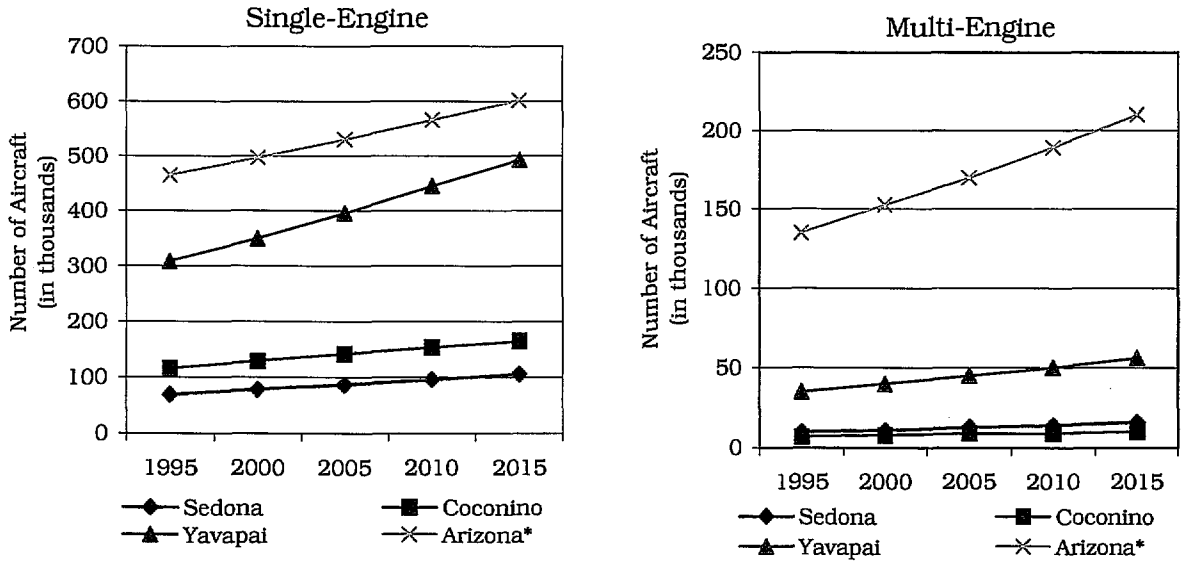
Note: According to Sedona Airport Administration, current (1998-1999) based aircraft total 103.

3.6 FLEET MIX

Understanding the aircraft fleet mix (types of aircraft) expected to utilize the airport is necessary in order to plan the facilities that will best serve the type of activities occurring at the airport. The aircraft fleet mix at Sedona Airport was determined by an inventory of the aircraft types currently based at the airport. Then, this information was compared to the 1995 SANS's existing and forecast general aviation fleet mix to identify regional trends (see Exhibit 3-3). The local, county, and state's fleet mix are not identical; however, the growth trends have followed similar patterns.

1995 SANS Forecasts by Aircraft Type for 1995-2015

Exhibit 3-3



The Sedona region has experienced increases in the percentage of single engine piston aircraft and a gradual increase in the percentage of multi-engine and other aircraft types. These trends were applied to the forecast of based aircraft for Sedona to determine the forecast fleet mix. The existing and forecast fleet mix is shown in **Table 3-6**.

Based Aircraft by Type Forecast

Table 3-6

Based Aircraft Type	1997	2002	2007	2017
Single Engine	93	108	115	140
Multi-Engine	7	8	9	11
Rotorcraft	3	3	4	5
Total Based Aircraft	103	119	128	156
Cumulative Change	--	+16	+25	+53

3.7 AIRCRAFT OPERATIONS FORECAST

3.7.1 Historical Operations

Annual operations include the total number of takeoffs and landings that occur at the airport during the year. To further describe the type of aircraft activities, operations can be expressed in terms of local and itinerant.[10]

- **LOCAL OPERATIONS** - Aircraft operating in the local traffic pattern or within sight of the airport, or aircraft known to be departing for or arriving from flight in local practice areas within a 20-mile radius of the airport or aircraft executing simulated instrument approaches at the airport. Generally, local operations are characterized as training operations.

- **ITINERANT OPERATIONS** - All aircraft arrivals and departures other than local operations. Itinerant operations are those aircraft operating with a specific destination away from the airport. Typically, itinerant operations increase with increases in business or industrial activity, since business aircraft are primarily used to carry company employees from one location to another.

Traditionally, the amount of general aviation activity has a high correlation with the number of based aircraft at an airport. Generally, an airport of the size and character of Sedona Airport can have a broad range of activity levels anywhere from 200 to 1,000 annual operations per based aircraft. In Sedona's case, the actual operations per based aircraft remain in the 400 range.

[10] Source: Airport Planning and Management, A.T. Wells, 1986

The high number of local operations is representative of the tourist activity around Sedona. In this case, there is a large mix of based and transient aircraft performing local operations (scenic flights). Further, the flight instruction activity operating out of the airport as well as the large number of visiting recreational and student pilots drive the local operations higher.

Many of the itinerant operations are also related to the tourist market in Sedona. As indicated by members of the Sedona Airport Administration, there has been a growing number of transient instructional flights, business charters and recreational flights visiting Sedona. Estimated total operations (local and itinerant) for 1997 are outlined in **Table 3-7**. As shown, approximately 18,000 operations (excluding tour operations) were actually counted by airport staff in 1997. An additional 25 percent (estimated by airport management) was added to this 18,000 figure to compensate for those non-tour operations occurring beyond that counted by the airport, adding nearly 4,500. With tour operations recorded at 14,000 in 1997, this brought the total annual 1997 operations to nearly 41,000.

Total Aircraft Operations for 1997

Table 3-7

Month	Operations without Tours
January	929
February	1,183
March	1,925
April	1,495
May	1,513
June	1,502
July	979
August	882
September	1,821
October	1,976
November	1,874
December	1,852
TOTAL	**17,931**
Plus 25 percent additional non-tour operations occurring beyond those recorded	**26,897**
Tour Operations	14,000
Total Operations with Tours	**40,897**

Note: Given by Sedona Airport Administration estimates, 1998 operations to be approximately 42,000.

The number of aircraft operations performed at Sedona Airport has varied in recent years, but generally increased. For example, 1992 estimated annual operations totaled 26,036, while 1997 operations were estimated at 40,897. It is important to point out that all historical operations published for the airport are estimates and that the accuracy is questionable since the airport is without an air traffic control tower. Thus, emphasis was placed on the more recent aircraft operations estimated by airport management for the master plan.

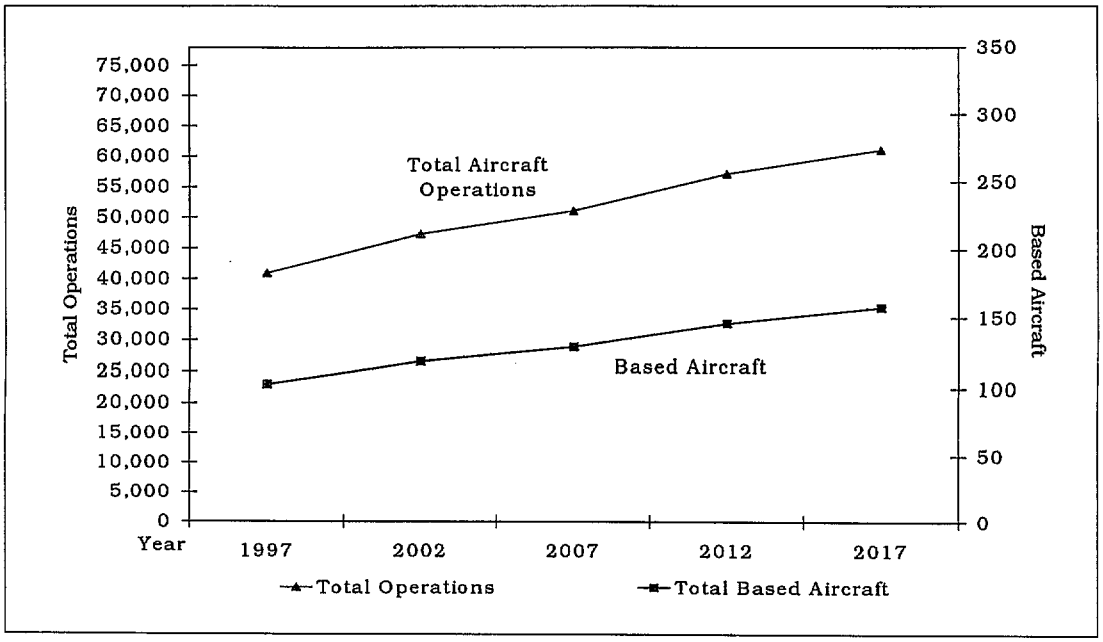
3.7.2 Operations Forecast

Aircraft operations for Sedona are projected to increase from nearly 41,000 in 1997 to nearly 62,000 by the end of the planning period, 2017. These projections are tied to the operations-per-based-aircraft (OPBA) ratio described previously. Sedona's 1997 OPBA was 397. This relationship is projected to remain stable throughout the planning period, as illustrated in Exhibit 3-4. This OPBA of 397 is up from the 1992 Master Plan level of 283.

This has been attributed to the strong increase in local and itinerant operations while the based aircraft levels have grown moderately. Further, the accuracy of the historical operations as mentioned previously is questionable and, thus, may partially contribute to the large discrepancy between the OPBA levels over a 5-year period.

Total Aircraft Operations and Based Aircraft Forecasts

Exhibit 3-4



Since the Sedona Airport is without a tower, there are no official records of local and itinerant operations. The local/itinerant split of total airport activity, provided by airport management, is estimated at 67 percent/33 percent. This split is projected to remain generally consistent throughout the planning period based on the projected growth of all airport activity segments (tours, charters/business flights, flight instruction, recreational flights, etc.). **Table 3-8** outlines the projected annual activity levels by local and itinerant operations for each phase of the planning period. Based aircraft are included for comparison.

Aircraft Operations Forecast at Sedona Airport

Table 3-8

Year	Based Aircraft	Local	Itinerant	Total Operations
1992	92	17,444	8,592	26,036
1997	103	27,401	13,496	40,897
2002	**119**	**31,654**	**15,590**	**47,244**
2007	**128**	**34,047**	**16,769**	**50,816**
2017	**156**	**41,494**	**20,438**	**61,932**

In addition to breaking operations into local and itinerant categories, there are other categorical splits that can define users at the airport. For Sedona, these include the categories of GA, air taxi, and military as described here.

- **Air Taxi** – Scheduled and/or non-scheduled aircraft operations carrying passengers and/or cargo for compensation. The capacity of air taxi aircraft is limited by Part 135 of the Federal Aviation Regulations. The tour operators conduct the majority of air taxi operations at Sedona.
- **General Aviation (GA)** – All aviation operations excluding scheduled and non-scheduled aircraft operations for hire (i.e. passenger and cargo transport for compensation) and military.
- **Military** - Operations by aircraft designated as military.

Table 3-9 summarizes the forecast of operations by these categories through the planning period. As shown, a steady growth is forecast for all categories with the exception of military, which is projected to generally remain constant through 2017.

Sedona Airport Annual Aircraft Operations by Type

Table 3-9

Year	Total Operations	GA Local 31%	GA Itinerant 23%	Air Taxi 42%	Military 3-4%
1992	26,036	12,758	7,550	4,686	1,041
1997	40,897	12,608	9,304	17,349	1,636
2002	**47,244**	**14,660**	**10,843**	**20,041**	**1,700**
2007	**50,816**	**15,833**	**11,727**	**21,556**	**1,700**
2017	**61,932**	**19,482**	**14,478**	**26,272**	**1,700**

Operations by Fleet Mix

In addition to defining the fleet mix of based aircraft at Sedona Airport, presented earlier, it is important to break down total airport operations by aircraft type. For Sedona, aircraft operating at the airport are in one of four categories identified as: single engine, multi-engine, jets, and rotorcraft/helicopters. **Table 3-10** summarizes the existing and ultimate percentage split of operations by aircraft type for Sedona through the planning period. As indicated, the percentage split is forecast to remain constant through 2017.

Sedona Airport Operations by Aircraft Type

Table 3-10

Year	Total Operations	SE	ME	Jets	Rotorcraft
Existing 1997	40,897	47%	18%	<1%	35%
Forecast 2017	**61,932**	47%	18%	<1%	35%

Note: Rounding may cause minor inaccuracies in totals.

3.8 PEAK DEMAND

The level of activity during peak periods is a measurement for developing facility requirements on the airport. According to the FAA publication, *Air Traffic Activity*, the following are standard peak activity factors with consideration for variables such as seasonal activities and population.

The peaking characteristics were applied to the forecast annual operations to obtain future peak operations at Sedona Airport. Experience has shown that as activity begins to increase, peak periods will begin to level out. A summary of these four peaking characteristics for the planning period is presented in **Table 3-11**.

Peak Demand Characteristics

Table 3-11

Annual Operations	The number of take-off and landings in a year.
Peak Month	The calendar month when peak aircraft operations occur. For planning purposes, the peak month has been projected at an even 12% of annual operations **(.12*Annual Operations).**
Design Day	The average day within the peak month. Normally, dividing the peak month operations easily derives this indicator by the number of days in the month.
Busy Day	A busy day in a peak month **(1.15*Design Day).** The busy day of a typical week in the peak month.
Design Hour	The peak hour within the design day. Design Hour is used particularly in airfield capacity/delay analysis as well as for terminal building and access requirements **(.125*Design Day).**

3.8.1 Peak Month

This indicator provides evidence of the seasonality of aircraft traffic volumes and a measure of the peak month in relation to an average month. This peak month factor is considerably higher than the standard 10 percent. However, this is to be expected given the busy spring time activity in the region. Additionally, the peak month percentage can be expected to remain relatively constant over the planning period as the seasonal population continues to contribute greatly to the peak spring and winter periods. It is important to note that only the peak month is the absolute peak within a given year. All other peaking factors are relative and could easily be exceeded at various times during the year. However, these factors do represent reasonable planning standards that can be applied without over building or being too restrictive.

3.8.2 Design Day

The Design Day, also called the average day of the peak month, will vary from year to year depending on the number of operations during the peak month. For planning purposes, it was assumed that the average day of the peak month would be one thirtieth of the peak month activity. This translates to a Design Day factor of 0.40 percent of annual operations.

3.8.3 Busy Day

For Sedona, this descriptor is used primarily to determine general aviation apron space needs. The busy day operations for a general aviation airport typically will run 10 to 20 percent greater than an average day. Since all the other activity characteristics are consistent with the norms at general aviation airports, the busy day operations factor has been assumed to be 115 percent of design day activity. This peaking factor has been projected to remain constant throughout the planning period.

3.8.4 Design Hour

Design Hour operations are used to establish the peak hourly demand affecting airfield and terminal facilities. Currently, the Design Hour operations were estimated to be approximately 12.5 percent of the design day operations and will remain level throughout the planning period. This is normal for an active general aviation airport. Design Hour operations will normally range from 10 to 15 percent of an average day depending on total activity.

3.8.5 Peaking Characteristics

Information provided by airport activity records was used to derive the peaking characteristics at Sedona. The count of aircraft operations for 1997, located in Table 3-7, reflected a 75 percent capture rate applied to provide a realistic level of activity that included evening operations at Sedona Airport. The annual peak activity is an estimate of the number of aircraft operations that can take place on the airfield in a monthly, daily, and hourly demand pattern at an airport. As shown in **Table 3-12**, the annual peak activity forecast calculated utilizes the current operations forecast.

Peak Activity Forecast

Table 3-12

Year	Annual Operations	Peak Month	Design Day	Busy Day	Design Hour
1992	26,036	3,124	104	120	13
1997	40,897	4,907	163	187	20
2002	47,244	5,669	189	217	24
2007	50,816	6,098	203	233	26
2017	61,932	7,432	248	285	31

3.9 POTENTIAL COMMUTER SERVICE

Commuter airlines provide the necessary air service to hundreds of smaller cities throughout the United States. In the case of Sedona, there have been two attempts to provide scheduled air service. Both Golden Pacific Airlines and Air Sedona (Scenic Air) discontinued service from Phoenix to Sedona.

Golden Pacific Airlines was the original commuter service that ended in 1988. Air Sedona, based out of Sedona Airport, started scheduled service in 1984 and discontinued in August of 1995. The following **Table 3-13** is a summary of commuter activity based upon enplanement records from 1984 to August 1995.

Revenue Passenger Enplanements

Table 3-13

Calendar Year	Total Passengers	Per Day
1984	3,656	10
1985	4,548	12
1986	6,780	19
1987	6,730	18
1988	4,748	13
1989	1,518	4
1990	3,651	10
1991	3,345	9
1992	3,528	10
1993	3,175	9
1994	2,457	7
Until August 1995	1,868	5

Source: Sedona Airport Administration, Airport Manager

Air Sedona maintained a 50 percent or more load factor while in service. They had four (4) scheduled round-trip flights to Phoenix and used four-to six-passenger airplanes. Air Sedona's scheduled was flexible and when no reservations were made, the flight was canceled.

The potential for renewed air service is unpredictable at best. However, subsequent chapters in the master plan briefly address the implications of such service in the future with reference to the *Arizona Air Service Study (ADOT Aeronautics, November 1998).* Currently, there are no scheduled carriers consulting with the airport sponsor regarding the possible start-up of scheduled service to Sedona.

3.10 SUMMARY

This chapter has provided forecasts for those indicators of aviation demand that are essential to the effective analysis of future facility requirements of Sedona Airport. The next step in the master planning process is to assess the capacity of the existing facilities and determine the size and quantities of various aviation facilities to meet future aviation forecast demands.

Based upon the projections of aviation demands developed in this chapter, a determination of future facilities will be examined in the next Chapter. **Table 3-14** is provided to summarize the various forecasting results and for easy reference in later portions of the Master Plan Study.

Summary of Forecasts

Table 3-14

	1997	2002	2007	2017
Area Population Level				
Sedona Service Area	33,078	37,082	41,873	56,513
Annual Operations				
Local	27,401	31,654	34,047	41,494
Itinerant	13,496	15,591	16,769	20,438
Total Operations	40,897	47,244	50,816	61,932
GA Local	12,608	14,660	15,833	19,482
GA Itinerant	9,304	10,843	11,727	14,478
Air Taxi	17,349	20,041	21,556	26,272
Military	1,636	1,700	1,700	1,700
Total Operations	40,897	47,244	50,816	61,932
Based Aircraft				
Single Engine	93	108	115	140
Multi-Engine	7	8	9	11
Rotorcraft	3	3	4	5
Total Based Aircraft	103	119	129	156

Note: Rounding may cause minor inaccuracies in totals.